manifolds each having one curve. These curves are shaped, so that the flow meter can be assembled without any additional curves being required.

Applicant has found that forming two curves in a single structure is difficult, especially with regard to reproducing those same two curves over and over again. Applicant notes that this difficulty is described in the original specification on page 4 lines 16 - 19. Present Fig. 6 shows difficulty with prior art flow tubes that have bends in two directions. Because of slight variations in forming the bends, the vibration characteristics of two flow tubes can be different. Applicant has found that it is much easier to have uniformity between flow tubes, when each flow tube is formed with a single bend. Applicant has found that this is possible when exhaust manifolds are formed with a curved branch and the end of the curved branch is in the same direction as the end of the flow tube. This avoids the problem of forming curved flow tubes with two different curves, and the reproducibility inaccuracies.

Applicant has reviewed the prior art, and finds no teaching nor suggestion of a flow tube having only a curve, manifolds having a one curve, and the connection between the manifolds and the flow tubes being in the same direction. The rejection states that Lew has flow tubes 44 and 45 joined to manifolds 47 and 47. Applicant assumes the Examiner is referring to elements 46 and 47 of Lew. Applicant has reviewed these elements of Lew, and in particular Fig. 5 of Lew. Applicant finds no teaching nor suggestion in Lew of separate structures of a manifold and a flow tube. Instead it appears that Fig. 5 of Lew shows a one piece construction and does not provide any details with regard to how any manifolds or flow tubes are formed. Lew clearly does not indicate separate manifolds and flow tubes. Lew therefore cannot indicate how and

where a manifold would be connected to a flow tube. Therefore Lew cannot disclose the specific relationship between the manifolds and the flow tubes in claim 1. Since this specific relationship is not present in Lew, Lew cannot anticipate this feature of claim 1, or cause this feature to be considered obvious.

The rejection also indicates that Keita discloses a similar arrangement of elements that comprise two measuring tubes 13 and 14 as shown in Figs. 2b and 3 that have a similar shape as the tubes 1 and 2 in Applicant's Figs. 1, 5 and 7. Applicant has reviewed Figs. 2b and 3 of Keita, and does not find any teaching nor suggestion of a manifold with curved branches, especially where the curved branches are in a direction that is similar to the direction of the ends of the flow tubes. Instead it appears from Figs. 2a and 3 of Keita that elements 13 and 14 have three individual bends, and that any manifold does not have any bends or curved branches at all. Therefore Keita cannot anticipate all of the features of claim 1, especially the relationship between the flow tubes and the manifolds.

Applicant has further reviewed Keita, and notes that Figs. 5 and 7 of Keita clearly show flow tubes 34 and 44 having a bend in the center, and two bends at each of the right and left ends. Elements 31 and 32 appear to be the structure most similar to the manifolds of the present invention, however elements 31 and 32 do not have any curved branches. Therefore it is quite clear that Keita does not have the relationship between the manifolds and the branches set forth in claim 1.

Applicant further notes that Fig. 5 in Lew, and the tubes in Keita, have more than one bend which Applicant has found to be disadvantageous. As Applicant has described previously,

and in the original specification, it is difficult to uniformly and repetitively produce flow tubes having more than one bend or curve. None of the prior art seems to recognize the difficult reproducibility of flow tubes in the corresponding references or the inaccuracies that it creates. It is only the present Applicant who sets forth this difficulty, and provides a solution. The flow meters of the present invention are therefore easier to produce, and/or less costly to manufacture. The specific flow tube and manifold combination of present claim 1, therefore is an improvement over the prior art, by providing more accurate or less expensive flow meters. Applicant respectfully requests patent protection for this improvement.

Applicant also notes that the embodiment of Fig. 5 of Lew does not use a pair of oscillation sensors installed along two parallel flow tubes, but instead uses differential pressure sensors 50 and 51. Applicant has found that the difficult of forming more than one curve in a flow tube causes difficulty in having the same vibration characteristics from flow tube to flow tube. The oscillation sensors of the present invention measure the vibration of the flow tubes. Since the embodiment of Fig. 5 of Lew does not measure vibration or oscillation at two separate points, but instead measures differential pressure, a person of ordinary skill in the art would not be led to believe that the particular shape of Fig. 5 of Lew would also be beneficial when a pair of oscillation sensors are used to measure vibration. Therefore it is Applicant's position there would be no incentive or motivation for the person of ordinary skill in the art to take the shape of Fig. 5 of Lew and incorporate that into Cage.

The rejection states that it would have been obvious to modify Cage using the teachings of Lew or Keita since Cage himself suggests that a plurality of shapes and flow conduits could

be utilized as long as they oscillate in a resonant manner. Applicant notes that Lew describes in column 8 lines 44 - 53, that the invention of Lew can be flexually vibrated at any desired frequencies, which may or may not be a natural frequency. Therefore a person of ordinary skill in the art looking for shapes of conduits that oscillate in a resonant manner, would not be led to the conduits of Lew. Lew is not concerned with natural frequencies, and operates on frequencies other than natural frequency. A person of ordinary skill in the art would have no indication in Lew, that the shapes of flow conduits would oscillate in a resonant manner. Therefore the suggestion or motivation in the rejection is contradicted by Lew, since Lew does not indicate that a resonant or natural frequency is needed. Claim 1 therefore further defines over the combination of the references.

Claim 5 also sets forth flow tubes and manifolds. The manifolds are set forth as having exit passages with a smooth curve where an axial direction of the passages at the ports or ends is in substantially the same direction as an axial direction of a respective end of a respective flow tube. This feature is similar to the relationship between the curved branches and the flow tubes in claim 1. As Applicant has described previously, this relationship between flow tubes and manifolds is not taught nor suggested in the prior art. Claim 5 therefore defines over the prior art for the same reasons as claim 1.

Claim 12 has been rejected as being obvious over Keita in view of Lew.

Claim 12 also sets forth manifolds and flow tubes. The manifolds are set forth as having branches which bend to terminate at a branch end, and the flow tubes are set forth as having a curve in only one direction where ends of the flow tubes are in the same directions as the ends

of the branches of the manifolds. As Applicant has described above, Lew and Keita do not describe manifolds ending and being correspondingly connected to flow tubes in a same direction. Therefore claim 12 defines over the combination of Keita and Lew.

Applicant also notes that claim 12 specifically sets forth flow tubes having a curve in only one direction. Keita clearly indicates flow tubes having three curves and therefore fails to meet this limitation. Since Lew does not indicate where any manifold or flow tubes start and stop, Lew cannot indicate a flow tube having only one curve. Therefore claim 12 further defines over the prior art.

Applicant has noted that the courts have decided that determining the source of a problem should be considered when determining obviousness. It is only the present Applicant who has discovered that accuracy can be increased, and costs can be lowered, by forming manifolds and flow tubes that connect in a same direction, and especially where the flow tube has only one curve. Since it is only Applicant which has discovered this problem, and provided a solution, the solution of the present invention therefore further defines over the prior art. Applicant respectfully requests patent protection for this improvement.

If the Examiner has any comments or suggestions which would further favorable prosecution of this application, the Examiner is invited to contact Applicant's representative by telephone to discuss possible changes.

At this time Applicant respectfully requests reconsideration of this application, and based on the above amendments and remarks, respectfully solicits allowance of this application.

Respectfully submitted
For Applicant,

By: _____
Theobald Dengler
Reg. No. 34,575

TD:tf
6859GRCE.4
Enclosed: Marked-Up Version of Claim 12

DATED: June 26, 2003
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SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.

MARKED-UP VERSION OF CLAIM 12

12. (~~NEW~~AMENDED) A Coriolis mass flow meter comprising:

an entry-side manifold with an inlet portion and integral first inlet branch and integral second inlet branch, said inlet portion extending in an axial direction, said first inlet branch bending to terminate at a first inlet branch end with a first inlet connection direction at an acute angle to said axial direction, said second inlet branch bending to terminate at an second inlet branch end with a second inlet connection direction at an acute angle to said axial direction;

an exit-side manifold with an outlet portion and integral first outlet branch and integral second outlet branch, said outlet portion extending substantially in said axial direction, said first inlet branch bending to terminate at a first inlet branch end with a first inlet connection direction at an acute angle to said axial direction, said second inlet branch bending to terminate at an second inlet branch end with a second inlet connection direction at an acute angle to said axial direction;

~~a first arched flow tube having a curve in only one direction and lying in a first plane, said first arched flow tube extending from a first joint end to a second joint end;~~

a first arched flow tube having a curve in only one direction and lying in a first plane, said first arched flow tube extending from a first arched flow tube first joint end to a first arched flow tube second joint end, said first arched flow tube first joint end being along said first inlet connection direction and being connected to said first inlet branch end and said first arched flow tube second joint end being along said first outlet connection direction and being connected to said first outlet branch end;

a second arched flow tube having a curve in only one direction and lying in a second plane, said second arched flow tube extending from a second arched flow tube first joint end to a second arched flow tube second joint end, said second arched flow tube first joint end being along said second inlet connection direction and being connected to said second inlet branch end and said second arched flow tube second joint end being along said second outlet connection direction and being connected to said second outlet branch end, said first plane and said second plane being substantially parallel;

a drive unit for driving and resonating said first arched flow tube with respect to said second arched flow tube at mutually opposite phases;

a pair of oscillation sensors installed at locations symmetrical with respect to said drive unit for sensing a phase difference proportional to a Coriolis force of fluid in said two flow tubes.